wavelength converter; and said intra-office signal output unit is arranged by an optical space switch, a wavelength converter and a wavelength-division multiplexer.

8. (ONCE AMENDED) An optical path cross-connect device as claimed in claim 4 wherein:

said intra-office signal input unit is arranged by a wavelength-division demultiplexer[,] and an optical space switch; said routing unit is constituted by a wavelength-division demultiplexer, an optical space switch, a wavelength converter and a wavelength-division multiplexer; and said intra-office signal output unit is arranged by an optical space switch, a wavelength converter and a wavelength-division multiplexer.

Please ADD new claim 11.

--11. (AS NEW) An optical network wherein:

a plurality of the optical path cross-connect devices as claimed in claim 3 are employed so as to constitute said optical network.--

IN THE DRAWINGS:

Please REPLACE Figures 6, 7, 10, 11, and 15 with Figures 6, 7, 10, 11, and 15 included in the Submission of Drawings filed concurrently herewith.

REMARKS

In the Office Action mailed December 4, 2002, the abstract of the disclosure was objected to; the drawings were objected to; claims 3-4 and 7-9 were rejected under 35 USC § 112, second paragraph, as being indefinite, claims 1-4 and 10 were rejected under 35 USC § 103(a) as being unpatentable over Shiragaki et al. (U.S. Patent No. 6,115,517) in view of Kuroyanagi et al. (U.S. Patent No. 6,072,610), and claims 5-6 were rejected under USC § 103(a) as being unpatentable over Shiragaki et al. in view of Kuroyanagi et al. and in further view of Suzuki et al. (U.S. Patent No. 5,005,166). The foregoing objections and rejections are respectfully traversed.

In accordance with the foregoing, the abstract and claims 1, 3, 4, 6, and 8 have been

amended. Claim 9 has been cancelled. New Claim 11 has been added. Claims 1-8, 10, and 11 are pending and under consideration.

Figures 6, 7, 10, 11, and 15 are amended in a Letter to the Examiner Requesting Approval of Changes to the Drawings filed concurrently herewith. Clean copies of Figures 6, 7, 10, 11, and 15, as amended, are presented in a Submission of Drawings also filed concurrently herewith. Entry of the foregoing amended Figures 6, 7, 10, 11, and 15 is respectfully requested.

Care has been exercised to avoid the introduction of new matter.

The abstract is amended, taking the Examiner's comments into consideration. Withdrawal of the objections to the abstract is respectfully requested.

Figure 6, 7, 10, 11, and 15 are amended for clarification.

Claim 9, which recited the "regenerator" which was the subject of the objections to the drawings asserted in the Office Action, has been cancelled. Withdrawal of the objections to the drawings is respectfully requested.

Claims 3, 4, and 7 are amended, taking the Examiner's comments into consideration. Although the Examiner asserted in the Office Action that claim 8 was rejected under 35 U.S.C. 112(2), no particular rejections of claim 8 under 35 U.S.C. 112(2) were asserted in the Office Action. Claim 8 is amended for clarification. Withdrawal of the rejections of claims 3, 4, 7, and 8 under 35 U.S.C. 112(2) is respectfully requested.

Shiragaki discusses an optical communication network apparatus and optical switching network. In the Shiragaki apparatus, each of subdivided routing units (in FIG. 5 (521, 531, 541, 551) ~ (52n, 53n, 54n, 55n)) processes wavelengths of all wavelength ranges (for example λ1 - λ32).

Kuroyanagi discloses an optical transmission system including "an optical path cross-connect device and an electrical cross-connect device connected by a plurality of working and standby input/output interface links" (refer to the Abstract of Kuroyanagi).

Suzuki discusses a time and wavelength division switching system having wavelength selectors selecting a time division multiplexed channel.

The combination of Shiragaki and Kuroyanagi is an optical communication network

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apparatus and optical switching network, including an optical path cross-connect device and an electrical cross-connect device, in which each of subdivided routing units processes wavelengths of all wavelength ranges.

The combination of Shiragaki, Kuroyanagi, and Suzuki is an optical communication network apparatus and optical switching network, including an optical path cross-connect device and an electrical cross-connect device, in which each of subdivided routing units processes wavelengths of all wavelength ranges, and including a time and wavelength division switching system having wavelength selectors selecting a time division multiplexed channel.

In the present invention, for example as recited in claim 1, an "optical path cross-connect device" includes "a wavelength branching unit", "an intra-office signal input unit", "'m' pieces of routing units", "a wavelength combining unit", and "an intra-office signal output unit".

Claim 3 recites an "optical path cross-connect device" includes "an optical branching unit", "an intra-office signal input unit", "'m' pieces of routing units", "a wavelength combining unit", and "an intra-office signal output unit".

The routing units input thereinto an optical signal outputted from either of the wavelength branching unit and the intra-office signal input unit via a first optical path group, and convert an input optical signal into a predetermined wavelength to thereby output a wavelength-converted optical signal to a second optical path group. The "m (symbol "m" being an integer and also being larger than 1)" pieces of routing units are subdivided into units of at least "n (symbol "n" being an integer and also being larger than 1)" wavelengths, as wavelength ranges (for example λ1 - λ8, λ9 - λ16, λ17 - λ24, and λ25 - λ32) to be processed by the respective routing unit are different from each other.

More particularly, claim 1 of the present application recites ""m" pieces of routing units for routing an optical signal within a pre-allocated wavelength range from optical signals outputted from said optical branching unit and said intra-office signal input unit to an intra-office signal output unit, and for converting said optical. signal within said pre-allocated wavelength range into a desirable wavelength to route a wavelength-converted optical signal to a second optical path group, said "m (symbol "m" being an integer and also being larger than 1) " pieces of routing units being subdivided in a unit of at least "n (symbol "n" being an integer and also being larger than 1)" wavelengths as wavelength ranges to be processed by the respective

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routing unit are different from each other".

Moreover, claim 3 recites ""m" pieces of routing units for routing an optical signal within a pre-allocated wavelength range from optical signals outputted from said optical branching unit and said intra-office signal input unit to an intra-office signal output unit, and for converting said optical. signal within said pre-allocated wavelength range into a desirable wavelength to route a wavelength-converted optical signal to a second optical path group, said "m (symbol "m" being an integer and also being larger than 1) " pieces of routing units being subdivided in a unit of at least "n (symbol "n" being an integer and also being larger than 1)" wavelengths as wavelength ranges to be processed by the respective routing unit are different from each other".

In the present invention, the wavelength converting type routing units, as units of expansion, are successively added in response to an increase in the number of wavelengths, resulting in a large-scaled optical cross-connect device and an optical network. Therefore, the present invention is easily expandable to accommodate the increase in the total number of wavelengths, while maintaining a better transfer characteristic (that is, a blocking characteristic).

However, none of the foregoing references relied upon, either alone or in combination, discusses or suggests the above-mentioned features of the present invention.

Dependent claims 2, 4, 5, 6, 10, and 11 are allowable at least for their dependence upon one of the foregoing independent claims 1 and 3, and recite further patentably distinguishing features of their own. For example, claim 2/1 recites "the optical signal transferred to said intra-office transmission line is wavelength-multiplexed; and both said intra-office signal input unit and said intra-office signal output unit repeat the wavelength-multiplexed optical signal".

Withdrawal of the foregoing rejections of claims 1-6 and 10, and allowance of new claim 11, is respectfully requested.

Also in the Office Action, the Examiner asserts that claims 7 and 8 would be allowable if amended to overcome the rejections of same under 35 U.S.C. 112(2). Claim 7 is amended to overcome the foregoing rejections. As discussed herein above, although the Examiner asserted in the Office Action that claim 8 was rejected under 35 U.S.C. 112(2), no particular rejections of claim 8 under 35 U.S.C. 112(2) were asserted in the Office Action. Claim 8 is amended for clarification. It is understood and therefore submitted that claims 7 and 8 are

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allowable.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: June 4, 2003

By: _____
Gene M. Garner II
Registration No. 34,172

700 Eleventh Street, NW, Suite 500
Washington, D.C. 20001
(202) 434-1500

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please CANCEL claim 9.

Please AMEND the following claims:

1. (ONCE AMENDED) An optical path cross-connect device for accommodating [a plurality of] an inter-office transmission line [(with wavelength multiplexing)] for transferring wavelength-multiplexed optical signals and a plurality of intra-office transmission lines [(without wavelength multiplexing)] for transferring a wavelength-non-multiplexed optical signal, comprising:

a wavelength branching unit provided with each of said inter-office transmission line, for demultiplexing the wavelength-multiplexed optical signals entered from said inter-office transmission line to a first optical path group;

an intra-office signal input unit provided with [each of] said intra-office transmission lines, for repeating [a] the wavelength-non-multiplexed optical signal entered from each of said intra-office transmission [line] lines to said first optical path group;

"m" pieces of routing units for inputting thereinto an optical signal outputted from any one of said wavelength branching unit [or] and said intra-office signal input unit via said first optical path group, and for converting said input optical [input] signal into a predetermined wavelength to thereby output [the] a wavelength-converted optical signal to a second optical path group, said "m (symbol "m" being an integer and also being larger than 1) " pieces of routing units being subdivided in a unit of at least "n (symbol "n" being an integer and also being larger than 1)" wavelengths as wavelengths ranges to be processed by the respective routing unit are different from each other;

a wavelength combining unit for accommodating thereinto said second optical path group and for selectively wavelength-multiplexing said wavelength-converted optical signal; and

an intra-office signal output unit for accommodating thereinto said second optical path group and for selectively repeating said wavelength-converted optical signal.

3. (ONCE AMENDED) An optical path cross-connect device for accommodating [a plurality of] an inter-office transmission [lines (with wavelength multiplexing)] line for transferring

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wavelength-multiplexed optical signals and a plurality of intra-office transmission lines [(without wavelength multiplexing)] for transferring a wavelength-non-multiplexed optical signal, comprising:

an optical branching unit provided with [each of] said inter-office transmission line, for branching [a] the wavelength-multiplexed optical [signal] signals entered from said [intra-office] inter-office transmission line into "m (symbol "m" being an integer and also being larger than 1) " pieces of first optical path groups, while maintaining the wavelength-multiplexed state;

an intra-office signal input unit provided with [each of] said intra-office transmission lines, for repeating [a] the wavelength-non-multiplexed optical signal entered from each of said intra-office optical transmission [line] lines;

"m" pieces of routing units for routing an optical signal within a pre-allocated wavelength range from optical signals outputted from said optical branching unit and said intra-office signal input unit to an [inter-office] intra-office signal output unit, and for converting said optical. signal within said pre-allocated wavelength range into a desirable wavelength to route [the] a wavelength-converted optical signal to a second optical path group, said "m (symbol "m" being an integer and also being larger than 1) " pieces of routing units being subdivided in a unit of at least "n (symbol "n" being an integer and also being larger than 1)" wavelengths as wavelength ranges to be processed by the respective routing unit are different from each other;

[a wavelength] an optical combining unit for accommodating thereinto said second optical path group and for selectively wavelength-multiplexing said wavelength-converted optical signal; and

an intra-office signal output unit for accommodating thereinto said second optical path group and for selectively repeating said wavelength-converted optical signal.

4. (ONCE AMENDED) An optical path cross-connect device as claimed in claim 3 wherein:

the optical signal transferred to said [inter-office] intra-office transmission line is wavelength-multiplexed; and both said

intra-office signal input unit and said intra-office signal output unit repeat the wavelength-multiplexed optical signal.

6. (ONCE AMENDED) An optical path cross-connect device as claimed in claim 2

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wherein:

said intra-office signal input unit is arranged by a wavelength-division demultiplexer[,] and an optical space switch; said routing unit is constituted by an optical space switch and a wavelength converter; and said intra-office signal output unit is arranged by an optical space switch, a wavelength converter[,] and a wavelength-division multiplexer.

8. (ONCE AMENDED) An optical path cross-connect device as claimed in claim 4 wherein:

said intra-office signal input unit is arranged by a wavelength-division demultiplexer[,] and an optical space switch; said routing unit is constituted by a wavelength-division demultiplexer, an optical space switch, a wavelength converter and a wavelength-division multiplexer; and said intra-office signal output unit is arranged by an optical space switch, a wavelength converter[,] and a wavelength-division multiplexer.

Please ADD new claim 11.

--11. (NEW) An optical network wherein:

a plurality of the optical path cross-connect devices as claimed in claim 3 are employed so as to constitute said optical network.--

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IN THE ABSTRACT:

Please REPLACE the current abstract with the following new Abstract:

ABSTRACT OF THE DISLCOSURE

An optical path cross-connect device includes a wavelength branching unit, an intra office signal input unit, "m" pieces of routing units, a wavelength combining unit and an intra-office signal output unit. The routing units input thereinto an optical signal outputted from either of the wavelength branching unit and the intra-office signal input unit via a first optical path group, and convert an input optical signal into a predetermined wavelength to thereby output a wavelength-converted optical signal to a second optical path group. The "m" (symbol being an integer and also being larger than 1)" pieces of routing units are subdivided into units of at least "n (symbol "n" being an integer and also being larger than 1)" wavelengths, as wavelength ranges to be processed by the respective routing unit are different from each other.

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IN THE DRAWINGS:

Please AMEND Figures 6, 7, 10, 11, and 15 as indicated in RED in the Letter to the Examiner Requesting Approval of Changes to the Drawings filed concurrently herewith.

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